39 Interfacing

“Don’t be afraid to invest. Someday it will pay off.”

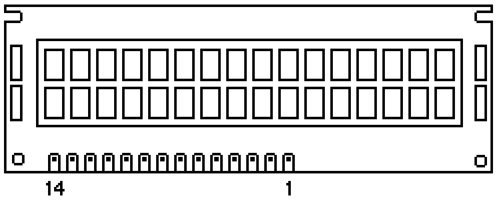
Interfacing refers to connecting our PC with some external devices. Interfacing got so many applications. In parcel service companies, weight gauge is been connected to the PC and so the billing process becomes simple. Otherwise, we have to find the weight separately… we have to enter the weight in the billing software… and then only it will produce the bill. In this chapter let us see a simple interfacing example.

39.1 Interfacing LCD with parallel port

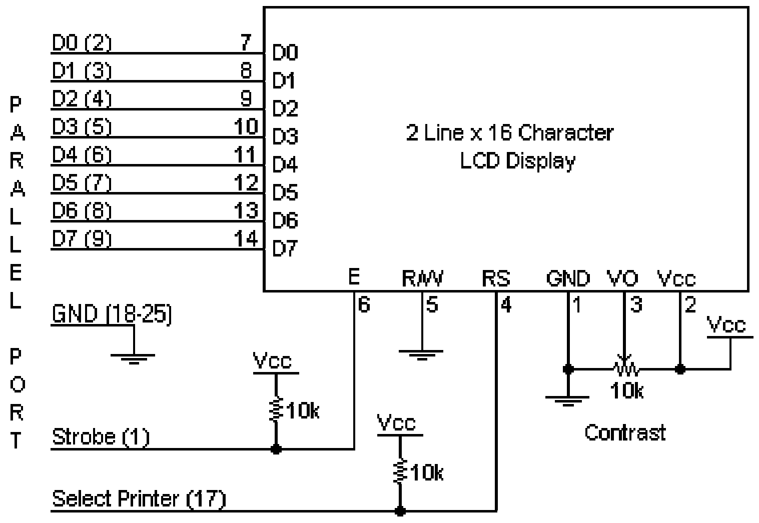
This is one of the elementary programs tried by beginners of this field. Here we interface the 2 Line X 16 Character display LCD with the parallel port. Parallel port is the one in which we would connect our printer. I hope 2 Line X 16 Character display LCD is affordable. Here our ultimate objective is to send a message from our C program to LCD via parallel port so that our message appears on the LCD display.

39.1.1 Circuit Diagrams

2 Line X 16 Character LCD display can be available from an electronic shop. The following diagram shows the pin numbers of a typical 2 Line X 16 Character LCD display.



Now you may need to know how to connect the LCD with the parallel port. The following diagram explains this.



39.1.2 Logic

You can see there are 14 pins in the LCD chip and 25 pins in the parallel port. As *control port* is an open collector/drain output, we connect it with LCD chip's Enable (E) and Register Select (RS) lines. We have added two 10K registers for safety measures. We just want to output (i.e., write) our message on the LCD. So we force the Read/Write(R/W) line to Write Mode. The contrast of the LCD display can be adjusted with the 10K potentiometer.

39.1.3 Program

```
#include <dos.h>
#include <string.h>

#define  PORTID         (0x378)  /*  Port Address */

#define  DATA           (PORTID+0)
#define  STATUS   (PORTID+1)
#define  CONTROL  (PORTID+2)

int main( void )
{
   char msg[ ] = { "Hello world!                "
               "A to Z of C                 " };
   char init[10];
   int i;
   init[0] = 0x0F;  /* Initialize LCD Display */
   init[1] = 0x01;  /* Clear LCD Display */
```

```
        init[2] = 0x38;  /* Dual Line / 8 Bits */

        /* Reset Control Port - for Forward Direction */
        outportb( CONTROL, inportb( CONTROL ) & 0xDF );

        /* Set Select Printer (RS) */
        outportb( CONTROL, inportb( CONTROL ) | 0x08 );

        /* Initialize LCD... */
        for ( i = 0; i < 3; ++i )
          {
            outportb( DATA, init[i] );

            /* Set Strobe (Enable)*/
            outportb( CONTROL, inportb( CONTROL ) | 0x01 );

            /* Delay */
            delay( 20 );

            /* Reset Strobe (Enable)*/
            outportb( CONTROL, inportb( CONTROL ) & 0xFE);

            /* Delay */
            delay(20);
          }

        /* Reset Select Printer (Register Select) */
        outportb( CONTROL, inportb( CONTROL ) & 0xF7 );

        /* Now display the message... */
        for ( i=0; i<strlen(msg); ++i )
          {
           outportb( DATA, msg[i]);

           /* Set Strobe */
           outportb( CONTROL, inportb( CONTROL ) | 0x01 );
           delay(2);

           /* Reset Strobe */
           outportb( CONTROL, inportb( CONTROL ) & 0xFE );
           delay(2);
          }
        return(0);
     } /*--main( )---------*/
```

In order to make our LCD panel work, first we have to initialize it. We can initialize it by sending the instructions: *initialize LCD*, *clear LCD* & *dual Line*. After initializing the LCD, we are supposed to clear the bit 3 of Control port. We did it by using

```
outportb(CONTROL, inportb(CONTROL) & 0xF7);
```

Then we sent our message to the LCD display using a `for` loop. If you have done everything well, you can see our message “`Hello world!          A to Z of C  `” on the LCD display.

Suggested Projects

1. Write an Image Scanner program.
2. Activate a remote control toy car from keyboard.
3. Develop a new inputting device for your game (say, your own steering). Use it to play your game or existing games.